March 1, 1962

SPECIFICATION

DATA LOGGER TYPE 1045

STATINTL FOR [redacted] TWO-COORDINATE COMPARATORS

[redacted] STATINTL

1.0 SCOPE

The data logger shall be suitable for connecting to the screws of a measuring comparator, shall digitally encode the X and Y coordinates measured by the comparator and shall display decimal values of these coordinates. The data logger shall also be suitable for connecting to an output writer, card punch, or tape punch, as specified in paragraph 3.3. On readout command, it shall generate electrical signals to cause the output device to tabulate or punch the digital X and Y coordinate values with other data as specified below.

2.0 GENERAL REQUIREMENTS

2.1 Major Components

The data logger system shall consist of two-pulse generator type reading heads, and electronic unit, a footswitch, and an output cable or connector, if required, for coupling to the output device.

2.2 X and Y Inputs

The reading heads shall be arranged for mounting on the measuring comparator and for coupling to the X and Y lead screw drive shafts. The gears, head mounting brackets, shafts and couplings necessary for adaptation are not supplied as part of the data logger. The heads shall furnish electrical signals to the electronic unit for digitally encoding the X and Y coordinates.

2.3 Resolution

The resolution of the encoding process shall be 1,000 counts per turn of the encoder, corresponding to one micron displacement in each coordinate. For comparators with a least count of two or more microns, a change in the electronic unit is needed.

2.4 Range

Each of the X & Y coordinates shall be encoded into a six-decimal digit number, corresponding to a range of up to 1,000 turns of the lead screw or 1,000 mm. range in the corresponding coordinate.

Negative coordinate values shall be indicated as complement numbers. For example, -.001 mm. shall be indicated as 999.999 mm.

2.5 Frame Counter

A six-decimal-digit counter shall be provided, which shall maintain a count of the number of printing or punching cycles that have occurred.

2.6 Identity or Constant Registers

Three registers of six-decimal digits each shall be provided for storing manually-inserted numerical data that is desired to be printed or punched with the coordinate values and frame count.

2.7 Input Keyboard

A keyboard shall be provided on the electronic unit for setting the X and Y registers, frame counter, and identity registers to any desired initial values. Ten keys shall be used for setting in digits 0 - 9. In addition, two keys shall be provided for setting in space and end characters for modifying the output format as specified in paragraph 3.2.

Pushbuttons shall also be provided for selecting the register which is to be set, and these same buttons shall be used for selecting the register whose contents are to be displayed.

2.8 Numerical Display

A six-decimal-digit, in-line, single-plane digital display shall be provided on the electronic unit. This display shall indicate the value of the X or Y coordinate as contained in the corresponding register, the frame count, or the contents of one of the identity registers. Pushbuttons, as specified in paragraph 2.7, shall be provided for selecting the register whose contents are to be displayed.

2.9 Printing or Punching Function

A pushbutton on the electronic unit and a foot switch shall be provided for starting the printing or punching readout cycle. When either of these controls is pressed and released, the digital values of the X and Y coordinates, the frame count, and the contents of the identity registers shall be set automatically into a buffer register, and signals shall be generated to cause printing or punching of the data as set in this register. On each printing or punching cycle, the frame count shall advance automatically one unit.

While the data in the buffer register are being printed or punched, it shall be possible to set the comparator to new coordinates or to set new values into the X, Y, or identity registers or the frame counter. Movement of the lead screws at any time, including the movement when the printing or punching cycle is initiated, shall not cause incorrect readings or other anomalous performance.

3.0 DETAILED REQUIREMENTS

3.1 Input Shaft Speed

0 to 15 revolutions per second in either direction and reversing.

3.2 Output Data Format

The values of X, Y, frame count, and identity digits shall be printed or punched in the following order, with the highest-order digit of each word first:

6 digits of X, space,
6 " " Y, " ,
6 " " frame count, space,
identity digits 1 - 6, space,
" " 7 - 12, " ,
" " 13 - 18, end pulse (carriage return).

If an end character is inserted as a digit in one of the identity registers, an end pulse shall be generated and the printing or punching cycle shall terminate at that point.

3.3 Output Circuits

The output circuits shall provide means for controlling any one of the following devices for printing or punching the desired data as selected at time of purchase.

Option 1: Output writer, IBM model B
Option 2: Summary punch, IBM type 526
Option 3: Card punch, IBM type 024 or 026
Option 4: Tape punch, Friden Model 2
Option 5: Tape punch, Teletype type LARP.

For options 1 - 3, the circuits shall control printing or punching characters 0 through 9, and the space and carriage return (skip for options 2 and 3) functions.

For options 4 and 5, the circuits shall control tape feeding and punching of twelve different characters in five-level code, the characters corresponding to digits 0 through 9, space, and end. Unless otherwise specified, the output code shall be binary coded decimal with odd parity check as follows:

Character	Code
0	10000
1	00001
2	00010
3	10011
4	00100
5	10101
6	10110
7	00111
8	01000
9	11001
space	11100
end	01110

(NOTE: Almost any code with up to 8 levels can be provided.)

3.4 Output Connections

Any cables, connectors, or couplers required for connecting the data logger to the output device shall be supplied. The data logger shall furnish control power from an internal supply, if required (options 1, 4, 5).

3.5 Printing or Punching Speed

Approximately ten digits per second.

3.6 Circuit Design and Construction

Transistor circuits shall be used. No electron tubes, gas discharge tubes or stepping switches shall be employed. To facilitate servicing, plugin circuit board construction shall be used.

3.7 Power

The data logger shall operate from a power source of 115 volts (nominal), 60 cps, single phase, and shall provide specified performance for line voltages of 90 to 130 volts. Power consumption shall not exceed 100 watts.

3.8 Warmup Time

The data logger shall be ready for use immediately (within two seconds) after power is turned on.

3.9 Interference

Electrical noise and magnetic fields normally encountered in a laboratory, such as those produced when switching motors and fluorescent lamps, shall have no effect on operation of the data logger.

3.10 Size

The electronic unit shall be contained in an attractive cabinet which shall be approximately 19 1/2" wide x 9 1/2" high x 21 1/8" deep.

3.11 Comparator Accuracy

Installation and use of the data logger shall have negligable effect on the accuracy of the comparator. The digitized reading will remain within one bit or count of the comparator dial reading.